EFCE Spotlight Talks

by the Working Parties and Sections

from 19 April to 29 April 2022

8 Webinars

EFCE
European Federation of Chemical Engineering

Cordial welcome to the SPOTLIGHT TALKS 2022, organised by the European Federation of Chemical Engineering and already the third in the series.

In the two previous years these highly focused webinars significantly contributed to the dissemination and popularisation of the top chemical engineering science, in spite of the pandemic global circumstances. It is noteworthy these presentations, delivered by leading industrial and academic experts, attracted attention of more than 2000 members of the virtual chemical engineering audience. This year there are eight SPOTLIGHT TALKS summoned by seven EFCE Working Parties, and one EFCE Section, all scheduled at the end of April.
A typical SPOTLIGHT TALK webinar has an appearance of an on-line meeting, up to three hours long, with a limited number of talks on a targeted topic, delivered by outstanding experts and professionals of the field. The webinars are completely free to attend.

These Working Parties and the Section are contributing: CAPE, Crystallization, Drying, Education, High Pressure Technologies, Mixing, Multiphase Fluid Flow, Membrane Engineering.

No doubts, very inspiring and stimulating treatment of Chemical Engineering science issues could be expected! Do not miss the SPOTLIGHT TALKS 2022.

19 April 09:30 — **Focus on current drying research within EFCE**

20 April 09:30 — **Population balance modeling in gas-liquid flows: a key to more reliable process design**

21 April 09:30 — **Impact of membrane engineering on the process engineering progresses**

26 April 09:30 — **Innovative Chemical Engineering Education**

26 April 15:00 — **Overcoming challenges in mixing processes with evolving rheology**

27 April 09:30 — **CAPE ideas for biomass uses**

27 April 15:00 — **Technology to improve conventional chemical engineering processes**

29 April 09:30 — **Role of crystallization in the production of battery materials and in battery recycling**

Central European Summer Time

EFCE Spotlight Talks

Working Party on Drying

19 April 2022

09:30 am • 11:15 am CEST

Focus on current drying research within EFCE

Drying is an essential physical unit operation that can be found in a lot of production processes within the chemical, pharmaceutical, and food sectors among others. It is usually considered that about 10 to 15% of the industrial energy consumption is due to drying operation. Besides being an energy intensive operation, drying can be crucial in terms of final product quality. This is why drying research remains an important field, with development related to the design of new or more efficient dryers, the better understanding of the relation between drying operating conditions and product quality, the reduction of the environmental impact, … based on both experimental and modeling approaches.
The aim of this webinar is to highlight some of the research done in the drying field researchers within EFCE members. This will be the opportunity to strengthen the network of researchers active in drying, in view of the next European Drying Conference postponed to 2023. The provisional program was done taking care of gender balance.

PROGRAM

09:30	**Welcome and introduction** Angélique Léonard – Chair WP Drying, University of Liège - Belgium Jarka Glassey, EFCE Executive Vice-President
09:40	**Towards efficient drying of high-quality vegetable seed** Julia Veser, Wageningen University - The Netherlands
10:10	**Operational dimensioning of drum dryers and review of the desing parameters** Tibor Poós, Budapest University of Technology and Economics - Hungary
10:40	**Study of multiphase flow inside the anodic porous transport layer of PEM water electrolyzer based on Lattice Boltzmann and Pore Network Models** Supriya Bhaskaran, Otto-von-Guericke-Universität Magdeburg - Germany
11:10	**Conclusion** Angélique Léonard – Chair WP Drying, University of Liège - Belgium

Registration

free of charge but mandatory

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EFCE Spotlight Talks

Working Party on Multiphase Fluid Flow

20 April 2022

09:30 am • 12:30 pm CEST

Population Balance Modeling in Gas-Liquid Flows: A Key to More Reliable Process Design

EFCE

For a successful design of gas-liquid reactors such as aerated stirred tanks or bubble columns, a thorough understanding of the fluid mechanics of gas–liquid flows is essential. The mechanics of gas–liquid flow is profoundly dependent on the bubble size distribution: Depending on the bubbles size, their shape and rise velocity vary, which has a strong effect on buoyancy-driven flows and thus on gas hold-up, mixing, shear stress, residence time distribution, and mass transfer performance, which in turn can affect the yield and selectivity of chemical and biochemical reactions. Therefore, for designing climate-friendly and sustainable processes with low resource consumption and reduced emissions, the reliable predictability and control of bubble size distribution plays a key role.
This Spotlight Talk will cover current developments and requirements for population balance modeling from both academic and industry perspectives. New experimental and numerical methods will be presented to inspire the next generation of Population Balance Models.

PROGRAM

09:30	**Welcome and introduction** Michael Schlüter – Chair WP Multiphase Fluid Flow, Hamburg University of Technology - Germany Jarka Glassey, EFCE Executive Vice-President
09:40	**Bubble size measurements and population balance modelling of bubbly flows: from lab cases to (more) industrial conditions** Frédéric Augier, IFP Energies Nouvelles, Lyon - France
10:10	**PBM for bubbly flows in industry – small-scale experiments & large-scale applications** Julia Hofinger, Sebastian Meinicke, Oliver Bey, Arne Hoffmann, Kai Ehrhardt BASF SE, Ludwigshafen – Germany
10:40	*Coffee break*
10:50	**Recent advances on bubbly flows modelling: population balances and large-eddy simulations** Antonio Buffo, Francesco Maniscalco, Mohsen Shiea, Marco Vanni, Daniele Marchisio Politecnico di Torino - Italy
11:20	**Experimental investigation of the heterogeneous regime in bubble columns: from the design of a new Doppler probe to bubble size distribution and velocity measurements** Martin Obligado, Alain Cartellier, University Grenoble Alpes - France
11:50	**Discussion**
12:30	**Final remarks and end of the Spotlight Talk** Michael Schlüter – Chair WP Multiphase Fluid Flow, Hamburg University of Technology - Germany

Registration

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EFCE Spotlight Talks

Section on Membrane Engineering

21 April 2022

09:30 am • 12:00 pm CEST

Impact of Membrane Engineering on the Process Engineering progresses

EFCE

The fast growing of membrane systems in industrial applications suggests the dissemination of last results at academic and industrial level, particularly in the areas of strategic interest. In this webinar, we will try to present the state of the art of well-established membrane operations and also new important opportunities. Exergy analyses for membrane units applied in desalination and in the ethylene process will be discussed. New metrics to compare the performance of membrane operations to conventional ones in the logic of process intensification will also be presented. The potential of membrane systems in the biofuel production and molecular dynamic simulations as tools to better control scaling issues inside membrane plants will be analyzed. Basic process control on membrane processes and how to assist feedback control strategies by the implementation of advanced logics and actions will be illustrated.

PROGRAM

09:30	**Welcome and introduction** Enrico Drioli – Chair of the Session on Membrane Engineering Petr Kluson, EFCE Scientific Vice-President
09:40	**Exergy analyses and new metrics to assess the role of membrane operations for a sustainable development** Alessandra Criscuoli, Istituto per la Tecnologia delle Membrane (CNR-ITM) - Italy
10:10	**CO_2 valorization through innovative membrane systems as a promising environmental pathway to biofuels** Adele Brunetti, Istituto per la Tecnologia delle Membrane (CNR-ITM) - Italy
10:40	**Molecular simulations for scaling prediction: case of nucleation and growth** Elena Tocci, Istituto per la Tecnologia delle Membrane (CNR-ITM) - Italy
11:10	**Development of advanced control systems and proper tools for membrane processes** Marco Stoller, Università di Roma "La Sapienza" - Italy
11:40	**Conclusion** Enrico Drioli – Istituto per la Tecnologia delle Membrane (CNR-ITM) - Italy

Registration

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EFCE Spotlight Talks

Working Party on Education

26 April 2022

09:30 am • 12:00 pm CEST

Innovative Chemical Engineering Education

EFCE

Facing a changing world, the evolution of the chemical engineering profession, of learners and of teaching methodologies, chemical engineering programmes have to evolve to meet industrial and societal needs, as well as the challenges of ecological and energy transitions.
Education is no longer limited to the acquisition of scientific and technical knowledge and their application to engineering analysis, design, practice or investigations. This is still necessary and must include new trends, but the development of professional competencies, such as ethics, critical thinking, creativity, team working or the capacity to make decision has now gained much more importance.
The webinar will share examples of innovative teaching methodologies and subjects promoting interdisciplinarity developed by the members of the Working Party Education of the European Federation of Chemical Engineering.

PROGRAM

09:30 **Welcome and introduction**
Eric Schaer, Chair WP on Education, Lorraine University – France
Petr Kluson, EFCE Scientific Vice-President

09:40 **Teaching professional ethics**
Jarka Glassey, Newcastle University - United Kingdom

10:10 **Use of Capstone Project to promote interdisciplinarity**
David Shallcross and Colin Scholes, University of Melbourne - Australia

10:40 **Importance of the work placement and its connection with research project**
Cilian O'Suilleabhain and Sandra Lenihan, Munster Technological University - Ireland

11:10 **Demonstration of immersive tools for chemical engineering training**
Tom Van Gerven, KU Leuven - Belgium

11:40 **Final remarks and panel discussion**
Eric Schaer, Chair WP on Education

Registration

free of charge but mandatory

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EFCE Spotlight Talks

Working Party on Mixing

26 April 2022

15:00 • 17:20 CEST

Overcoming challenges in mixing processes with evolving rheology

EFCE

Processes with evolving viscosity or rheology during product manufacturing are encountered readily in diverse industries, such as foods, personal care, pharmaceuticals, paints, lubricants, polymers and plastics. Rheology, and therefore apparent viscosity, can change during the manufacturing of such products due to the creation of complex microstructures and/or chemical reaction. Evolving rheology presents a number of challenges in mixing operations because it very often results in a change of flow regime, transitioning from turbulent to laminar or vice versa. This brings about a number of questions on the local flow behavior and mixing mechanisms of such systems and how equipment should be designed to accommodate for flow changes.
This webinar aims at addressing some of the challenges that can be experienced when mixing fluids with evolving rheology. In particular, we will look at why mixing in such systems can be so complex, how we can better understand the flow behavior through experiments and simulation, as well as the challenges associated with these methods, and what is the best way to design mixing equipment to ensure effective mixing.

PROGRAM

15:00 **Welcome and introduction**
Joelle Aubin, Chair WP Mixing, University of Toulouse - France
Jarka Glassey, EFCE Executive Vice-President

15:10 **Mixing challenges in the formulation of complex microstructured products**
Prof Mark Simmons, University of Birmingham - United Kingdom

15:40 **Measuring mixing in viscous and evolving rheology fluids**
Dr Tom Rodgers, University of Manchester - United Kingdom

16:10 **Simulations of viscous thixotropic liquids and the way they respond to agitation**
Prof Jos Derksen, University of Aberdeen - United Kingdom

16:40 **Industrial Processes and Equipment to Handle Fluids with Complicated Rheology**
Dave Dickey, Mixtech, USA

17:10 **Conclusion**
Joelle Aubin, University of Toulouse - France
Claudio Fonte, University of Manchester - United Kingdom

Registration

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EFCE Spotlight Talks

Working Party on Computed Aided Process Engineering

27 April 2022

09:30 am • 12:15 pm CEST

CAPE ideas for Biomass uses

EFCE

The global need for renewable sources, to achieve fossil fuels independence, led to consider biomasses for energy and chemicals production. This opened the way to the research of optimized processes that could be also convenient from economical and environmental points of view. In the presentations, some issues related to biorefineries concept and biomasses uses will be discussed, and critically analyzed.

PROGRAM

09:30	**Welcome and introduction** Prof. Giulia Bozzano, Politecnico di Milano - Italy Petr Kluson, EFCE Scientific Vice-President
09:40	**Process Research at Biorefinery-Scale and Process Design for Decentral Processing** Dr. Eng. Joern Viell, RWTH Aachen University - Germany
10:15	**Systematic process and bioproduct design towards integrated biorefineries** Mariano Martín, Universidad de Salamanca - Spain
10:50	**Challenging the XDEM Simulation Platform for Large Scale Biomass Furnaces** Prof. Berhard Peters, University of Luxembourg - Luxembourg
11:25	**Uncertainty in techno-economic and sustainability assessment of Biorefineries** Nikolaus Vollmer and Gürkan Sin, DTU Chemical Engineering, Lygnby, Denmark
12:00	**Final remarks and panel discussion** Prof. Giulia Bozzano, Politecnico di Milano - Italy

Registration

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EFCE Spotlight Talks

Working Party on High Pressure Technology

27 April 2022

3:00 pm • 6:30 pm CEST

Technology to improve conventional chemical engineering processes

Chemical engineering can provide the answers to the major challenges in developing sustainable processes. Pressure is a variable that allows the intensification of processes with compact equipment and with reaction media and solvents properties, which improve yield and selectivity, thereby simplifying downstream processing. Water and CO_2 are widely recognised as green solvents, in which pressure can provide enhanced solvent properties for CO_2 or in transforming water into a non-polar solvent. The constant improvement of pressurised technologies enables the goal of creating energy efficient processes. This webinar will present examples of high-pressure technologies that significantly improve the conventional processes used in chemical, food, and pharma sectors. As a result, they provide enhanced safety and quality of solvent-free products, which go beyond the requirements of more restrictive future legislation.

PROGRAM

15:00 **Welcome and introduction**
María J Cocero, Chair WP on High Pressure Technology, Valladolid University – Spain
Giorgio Veronesi, EFCE President

15:10 **Sterilization by supercritical CO_2**
Lourdes Calvo, Complutense University of Madrid - Spain

15:40 **Extraction of medicinal plants by high-pressure technologies**
Erika Mária Vági, Budapest University of Technology and Economics - Hungary

16:10 **CPF Technology – application of CO_2 extracts in industrial product development**
Sabine Grüner-Lempart, Weihenstephan-Triesdorf University, Germany

16:40 **High-pressure food processing**
Carl Schaschke, University of the West of Scotland, United Kingdom

17:10 **Chemical Reaction Engineering for Sustainable Value Chains in the Chemical Industry**
Thomas E. Müller, Ruhr University Bochum, Germany

17:40 **High-pressure technologies from a process engineering perspective**
Luis Vaquerizo, Técnicas Reunidas - Spain

18:10 **Final remarks and panel discussion**
María J Cocero, Chair WP on High Pressure Technology

Registration

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EFCE Spotlight Talks

Working Party on Crystallization

29 April 2022

09:30 am • 12:30 pm CEST

Role of crystallization in the production of battery materials and in battery recycling

EFCE

The global shift to renewable energy sources, to achieve fossil fuels independence, is leading to fast electrification and energy storage. It is estimated that more than one hundred giga-size factories need to be built to keep up with demand until 2030. Ideally, the industrial manufacturing of batteries should be sustainable, with low environmental impact, stable, competitive, and "smart", heavily relying on automation, digitalization, mathematical modelling, and machine learning. Crystallization and precipitation play a crucial role in this global challenge. Precipitation is, for example, employed to produce nickel-manganese-cobalt hydroxide, precursor of the popular NMC cathode material, crystallization is the key step in traditional and innovative battery recycling processes, as well as in sustainable processes where magnesium and lithium are extracted from saltwork brines. In five presentations these issues will be discussed and critically analyzed.

PROGRAM

09:30 **Welcome and introduction**
Daniele Marchisio, Chair WP on Crystallization, Politecnico di Torino – Italy
Giorgio Veronesi, EFCE President

09:40 **Role of crystallization/precipitation in battery material precursor production**
Lukas Metzger, BASF – Germany

10:10 **Fractional crystallization of critical raw materials in the context of battery recycling**
Béatrice Biscans, University of Toulouse - France

10:40 **Sustainability assessment of future battery recycling processes**
Marja Rinne, Aalto University - Finland

11:10 **Use of novel process intermediates in the development of low temperature hydrometallurgical lithium battery cathode recycling/production methodologies**
Sergio Carrillo, University College Dublin - Ireland

11:40 **Crystallization of Lithium for saltwork brines in the SEArcularmine project**
Daniel Winter, Fraunhofer Institute ISE, Germany
Andrea Cipollina, University of Palermo - Italy

12:10 **Final remarks and panel discussion**
Daniele Marchisio, Chair WP on Crystallization

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